National Aerospace Laboratories

***Class* : RESTRICTED**
No. of copies : 5

Title CASCADE TESTS ON CE 20 LOX TURBINE SECOND ROTOR BLADE PROFILE

Authors : R.Senthil Kumaran, K.M.M.Swamy

Division : Propulsion

NAL Project No. P-0-279

Document No. : PD-PR- 0613

Date of issue: APRIL 2006

Contents: Pages 42 Figures 23 Tables 9 References 6

External Participation : –

Sponsor : LPSC, ISRO, Thiruvananthapuram

Approval : Head , Propulsion Division

Remarks :

Keywords : Aerodynamic performance, aerofoil, blade loading, cascade test, choke, chord, flow visualization, impulse turbine, pitch, probe, stagger, scanivalve, scanner, separation, test section, tunnel, wake

Abstract : LPSC, ISRO as part of their CE 20 cryogenic engine development program, desired to get the liquid oxygen [LOX] turbo pump turbine profiles tested in the NAL Transonic Cascade Tunnel to obtain basic aerodynamic performance data. The LOX turbine consists of a nozzle, first rotor, stator and second rotor. Similar profiles have been designed for the first rotor, stator and second rotor with minor changes in stagger angle and pitch. Hence, the same cascade blades were used to test the first rotor, stator and second rotor configurations at respective pitch, stagger and flow conditions. The tests on the first rotor and stator configuration have been completed earlier. The test details and results of the LOX second rotor configuration are presented in this report. The LOX second rotor configuration was tested at three different inlet flow angles and six outlets Mach numbers. Performance parameters such as profile loss, exit flow angle, flow velocities and surface Mach number distribution were evaluated.